1207240

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN OR RELATING TO E.H.T. COMPONENT ASSEMBLIES

(71) We, SIEMENS AKTIENGESELLSCHAFT, a German Company of Berlin and Munich, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The invention relates to electrical component assemblies for use in E.H.T. circuits and the like, where a high breakdown resistance is required, there being a number of electrical components connected together in a common unit.

For television receivers, the E.H.T. supply for the picture tube is normally obtained by use of a line transformer, which supplies high voltage pulses that are rectified to provide the d.c. potential to be fed to the picture tube. The line transformer and the associated rectifier arrangement must have a high breakdown resistance, and there are a number of problems involved in ensuring that the transformer can deliver the full E.H.T. output at its secondary. This applies in particular to colour television receivers, which normally require a d.c. potential of 25 kV.

It is therefore advantageous to design the line transformer of a colour television receiver to produce a lower voltage output signal and then obtain the required d.c. potential by a known kind of voltage multiplier arrangement. For example, the line transformer can be arranged to supply fly-back pulses with an amplitude of 8.5 kV to a voltage multiplier cascade arrangement employing five selenium rectifiers and four or five capacitors, to develop a d.c. potential of 25 kV.

The requirement for component assemblies having a high breakdown resistance and secure against corona discharge effects is not restricted to voltage multipler cascade arrangements of the type referred to, but is a common problem throughout the electrical engineering field, wherever it is necessary to guard against the risk of damage to neighbouring pieces of equipment or to personnel, or to prolong the working life of components.

The individual components of an E.H.T. circuit are therefore frequently grouped together to form a unitary assembly which can be installed or exchanged as a standard component. The individual components are frequently potted together in a compact block, using a synthetic material. However, there is the problem of ensuring good heat dissipation, and the further difficulty that if the wall thickness of the potting mass containing the components is not sufficiently uniform, the metallic portions of the individual components or the connections between them may be too near the surface, so that glow-discharge phenomena or flashover takes place. These latter drawbacks can be avoided by arranging for the components of the high voltage unit to be fixed to a baseplate and potting the entire unit in a cup-shaped housing of a material which bonds to the potting compound. However, this method of potting is relatively expensive, and renders the problem of cooling the components even more difficult.

The invention consists in an electrical component assembly in which a plurality of electrical components are connected in a common circuit and arranged together in a single plane embedded in a synthetic resin to form a mechanically stable lattice-shaped unit, each arm of the lattice containing at least one component provided with a surface portion of relatively high breakdown resistance, which component is positioned on the longitudinal axis of that arm, there being a plurality of notches provided in the synthetic material which terminate at said surface portion of that component. The term "lattice" is used to refer to an open-work planar structure in which a plurality of apertures are formed between arms which cross or intersect.

The invention will now be described with reference to the accompanying drawings, in which: —

Figure 1 illustrates one exemplary embodiment of the invention; and

Figure 2 is an end view of the embodiment shown in Figure 1.

The component assembly shown in Figure 1 is a voltage multiplier unit for a 25 kV E.H.T. supply voltage required in colour television picture tubes. The components are arranged in the arms of a lattice 3, three selenium rectifiers 1 being contained in parallel arms and two selenium rectifiers 11 in diagonal arms, while four capacitors 2 are contained in separate side arms. A fifth capacitor is employed in the multiplier circuit, but this is not contained within the potted assembly in this embodiment. To clarify the illustration, that part of the layer of potting material forming the lattice 3 which covers the top of the components has been omitted.

Figure 2 similarly illustrates a side elevation of the arrangement of Figure 1, and in both Figures the references 5, 6 and 7 indicate the connecting leads which extend to the exterior through the envelope of synthetic resin. In each arm, the associated component has been positively centred on the longitudinal axis of its arm during potting, notches 4 in the synthetic resin envelope terminating at the high breakdown resistance portions of the surface walls of the components 1, 11 and 2, making it possible to ensure uniform wall thickness in the envelope despite the absence of an outer casing, thus preventing any displacement of the metal caps of the rectifiers, or of the soldered joints, towards the surface.

In order to manufacture a component assembly in accordance with the invention, the components are loosely assembled and wired-up to form an open lattice arrangement, and are then laid in a mould consisting of a material such as polyethylene which does not bond to the potting resin (e.g. epoxy resin), in which mould wedge-shaped centering ribs are provided upon whose edges (disposed at an interval from the internal wall of the mould) the high breakdown resistance walls of the individual components rest. Preferably, three centering ribs are provided for each component, and these each extend in U-fashion along a cross-section of the mould, so that a positive location of the loose components in the arms of the lattice is obtained within the detachable mould. The open lattice unit it provided with fixing lugs 8 and 9 so that it can be mounted horizontally in the equipment, to permit the air flow developed by the heat of the equipment to pass as a cooling flow through the lattice openings without meeting any great resistance, and thus cool each subsidiary component very efficiently. Furthermore, this open construction leads to a minimum consumption of potting resin.

By the arrangement of the fixing lugs on the side arms containing capacitors at which the two connecting leads 6 and 7 extend to the exterior, it is automatically ensured that when attaching the cascade arrangement to a metal chassis, the capacitor row to which the connecting lead 5 goes, which is at a high a.c. potential, is further away from the equipment chassis, so that the capacitive leakage current thereto is extremely low. This is desirable, since such current impairs the operation of the circuit and leads to an extra loading on the line transformer and the line output stage.

WHAT WE CLAIM IS:—

1. An electrical component assembly in which a plurality of electrical components are connected in a common circuit and arranged together in a single plane embedded in a synthetic resin to form a mechanically stable lattice-shaped unit, each arm of the lattice containing at least one component provided with a surface portion of relatively high breakdown resistance, which component is positioned on the longitudinal axis of that arm, there being a plurality of notches provided in the synthetic material which terminate at said surface portion of that component.

2. An electrical component assembly as claimed in Claim 1, in which said synthetic resin is an epoxy resin.

3. An electrical component as claimed in Claim 1 or Claim 2, in which integral fixing lugs are formed on the lattice-shaped unit.

4. An e.h.t voltage multiplier unit comprising an electrical component assembly as claimed in any one of Claims 1 to 3, in which capacitors are contained in aligned side arms of said lattice unit which form two parallel rows, and rectifier elements in arms perpendicular to said parallel side arms and in diagonal arms.

5. An e.h.t. voltage multiplier unit as claimed in Claim 4, in which a separate connecting lead is provided at one end of one of said parallel rows, and at both ends of the other of said parallel rows, said connecting leads extending through the synthetic resin envelope, and fixing lugs being provided on the parallel row which is provided with two connecting leads.

6. An e.h.t. voltage multiplier unit substantially as described with reference to the accompanying drawings.

7. A method of manufacturing a high breakdown resistance electrical component assembly as claimed in any one of Claims 1 to 6, including the steps of connecting the components together whilst loosely assembled in a lattice form, placing the assembled components in a mould consisting of a material that does not bond to the potting resin to be used, and potting the assembly whilst high breakdown resistance portions of the walls of the individual components rest upon wedge-shaped centering ribs.

8. A method as claimed in Claim 7, in which said mould is made of polyethylene.

9. A method as claimed in Claim 7 or Claim 8, in which each component is located in the mould by three centering ribs.

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1207240 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.1

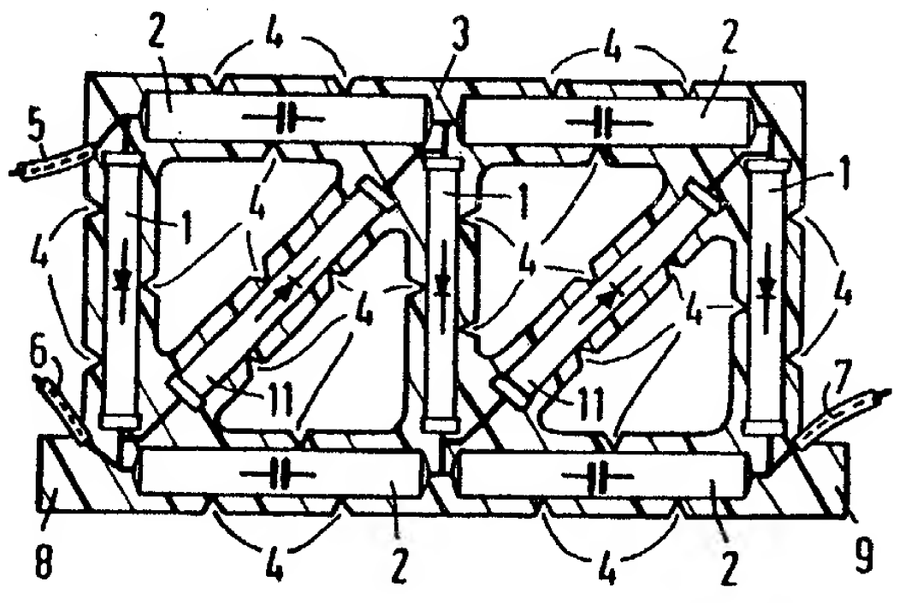

Fig.2